



T0025-P Assessing Vestibulo-Ocular Function and Spatial Orientation in Parabolic Flight

Problem Statement

- As defined by the NASA Human Research Program: there is a need for “a new, innovative, hand-held smart-device requiring minimal power and mass for assessment and rehabilitation of crewmembers on lunar and Mars surfaces.”
- Our device will fulfill this need for rapid sensorimotor assessment.
- Parabolic flights provide space-relevant g levels for testing, and induce sensorimotor changes similar to those of space flight.
- Potential users: NASA astronauts, flight surgeons. Others requiring sensorimotor assessment in the field.

Technology Development Team

- PI: Mark Shelhamer, Johns Hopkins University School of Medicine, mjs@dizzy.med.jhu.edu.
- Funding: NASA HRP.
- Technology partners: none.

Proposed Flight Experiment

Experiment Readiness:

- Ready for flight May 2012.

Test Vehicles:

- Parabolic aircraft.

Test Environment:

- Previous versions (different hardware) flew in parabolic flight in 2010 and 2011. Testing is requested in all available g levels (0, 1.8, lunar).

Test Apparatus Description:

- Tablet computer: presents visual display, records motion, accepts user input through touch screen.
- Wireless motion sensors: record user motion.
- Red/Green goggles: binocular display presentation
- Black shroud: to reduce ambient lighting.



Technology Maturation

- Current TRL: 4 *component and/or breadboard validation in laboratory environment.*
- TRL 5 *validation in relevant environment* – flights in 2012 & 2013 to verify proper operation of components for sensorimotor assessment, user interfacing.
- TRL 6 *demonstration in relevant environment* – flights in 2013 & 2014 with integrated hardware & software; modifications based on previous flight experience.
- TRL 6 deadline: August 2014.

Objective of Proposed Experiment

- 1) determine if test subject can use device quickly and easily, 2) determine if assessment tests implemented on device are sensitive enough to detect sensorimotor changes induced by flight.
- Data will be obtained on device functionality (measurement of sensorimotor changes), and user interface (reporting of sensorimotor perceptions). Any deficiencies in these areas will lead to redesign and re-flight.